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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/879,428

06/12/2001

Henry A. Hill

09712-124001 / Z-288
Low

4098

26161 7590 06/19/2003

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EXAMINER

ARTMAN, THOMAS R

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 06/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/879,428

Applicant(s)

HILL, HENRY A. 

Examiner

Thomas R Artman

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14-21 is/are allowed.
- 6) ☒ Claim(s) 1,3-6 and 8-10 is/are rejected.
- 7) ☒ Claim(s) 2,7 and 11-13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The contents of the IDS, filed June 12th, 2001, was considered before the previous Office action on the merits was made. The corresponding PTO-1449 was initialed; however, the copy was inadvertently not mailed. The copy is provided attached to this Office action.

Response to Arguments

As correctly pointed out in the previous Office action, the examiner withdraws all rejections made using Hill (US 6,137,574) because the reference does not qualify as prior art. However, a reference made of record applies, at least in part, and is used in the following new rejections.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-6 and 8-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Makinouchi (US 5,969,800).

Regarding claim 1, Makinouchi's servo-controlled interferometric positioning system performs the following functions, including:

1) generating a compensated position signal (Eq.8, top of col.11) based upon the interferometrically derived position signal and at least one correction term (Eq.5, bottom of col.9) that has a sinusoidal dependence upon the position of the measurement object, and

2) repositioning the measurement object based on the compensated position signal and a desired position of the measurement object.

With respect to claim 3, the at least one sinusoidal correction term is subtracted from the interferometrically derived position signal.

With regards to claim 4, the interferometrically derived position signal is the phase of an interferometric intensity signal at a heterodyne frequency.

In regards to claim 5, the interferometrically derived position signal is a heterodyne, interferometric intensity signal.

With respect to claim 6, the term in Eq.5 comprises multiple sinusoidal correction terms.

With regards to claim 8, the measurement object is a stage in a lithography tool.

In regards to claim 9, the measurement object can also be a stage in a beam writing tool.

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Regarding claim 10, Makinouchi's device has:

- 1) an input port and output port,
- 2) a memory which stores non-linear errors in the interferometry system (exemplified by the various terms in the compensation equation, Eq.8), and
- 3) a processor which generates a compensated position signal based upon the position signal from the interferometry system and the stored representation.

Allowable Subject Matter

Claims 14-21 are allowed over the prior art made of record.

Claims 2, 7 and 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 2, the reasons for indicating allowable subject matter were made clear in the previous Office action.

Regarding claim 7, none of the prior art made of record discloses or reasonably teaches the additional limitation of the sinusoidal correction terms being representative of cyclic errors.

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Makinouchi's sinusoidal correction terms are functions of the position of one stage with respect to the other and are not related to cyclic errors of the interferometric system.

Regarding claim 11, the prior art made of record, alone or in combination, does not disclose or reasonably teach the additional limitation of the non-linear errors being expressed as a sum of multiple correction terms, each having a sinusoidal dependence upon the position of the measurement object.

Makinouchi's representation (Eq.8) only has one term (the first position vector) that has a sinusoidal dependence upon the position of the measurement object.

Regarding claim 12, the reasons for indicating allowable subject matter were made clear in the previous Office action.

Claim 13 is objected to by virtue of being dependent upon objected claim 12.

Regarding claim 14, the reasons for allowance were made clear in the previous Office action.

Claims 15-21 are allowed based upon being dependent upon independent claim 14.

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Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ostby (US 5,940,180) discloses a servo-controlled positioning interferometer for use in machining tools.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R Artman whose telephone number is (703) 305-0203. The examiner can normally be reached on 8am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

Thomas R. Artman
Patent Examiner
June 10, 2003



DAVID V. BRUCE
PRIMARY EXAMINER